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We take pleasure in distributing this report which summarizes the findings of our 1985 wildlife population and habitat study carried out at Redberry Lake, Saskatchewan. This lake, along with its islands and associated shoreline, provides a nationally important habitat for endangered and threatened bird species.

Because of the federal Migratory Bird Sanctuary status of the lake, and the strong interest of Saskatchewan in its rich wildlife resources, it was felt at the outset that this should be a joint study by the Canadian Wildlife Service and the Saskatchewan Wildlife Branch. We would like to acknowledge here the most valuable assistance provided to our field data collection by the Saskatoon members of the Saskatchewan Natural History Society. The assistance of many other individuals is recognized in the report.

The present report is intended to serve as a summary of current data and the recommendations which are felt to be necessary for the protection of wildlife populations and habitats at Redberry. A full technical report is in preparation for those who may require more detailed information on the study.

We feel that the current review of Redberry's wildlife resources is important and timely. It provides greatly improved baseline information on wildlife distribution and abundance on and around the lake. With the possibility of expanded recreational development and human activity in the area, the new information should provide a sound basis for responsible management to guide these developments and minimize its impacts on Redberry Lake's wildlife.

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SUMMARY OF

BIRD STUDIES AND MANAGEMENT RECOMMENDATIONS FOR

THE REDBERRY LAKE AREA

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INTRODUCTION

Redberry Lake is nationally important to wildlife because it supports breeding populations of the endangered Piping Plover and the threatened American White Pelican. It also supports the largest known breeding concentration of White-winged Scoter and it provides breeding and migration habitat for many other birds. A saline lake approximately 10 km in diameter, Redberry is located 100 km northwest of Saskatoon in gently rolling aspen parklands. The waters and islands of the lake are a federal Migratory Bird Sanctuary, totalling approximately 5,610 ha. The lake has a fringe of beaches, grasslands and aspen groves which are surrounded by extensively cultivated farmlands. Much of the native habitats adjacent to the lake are included in provincial Crown land which has been rated Critical (920 ha) or Important (410 ha) Wildlife Habitat (Figure 1). The islands are also Provincial Wildlife Refuges.

Developments for recreation on the lake have been quite modest to date: a Regional Park on the northwest shore with a small sailing club, a church camp and a few cottages on the east shore. In 1985, a private developer, The Redberry Development Corporation, proposed to construct a cottage and recreation subdivision on the southwest shore of the lake (Figure 1). Also in 1985, the Saskatchewan Fisheries Branch began an experimental program to stock the lake with Rainbow Trout for sport fishing. Since those developments could bring a major increase in recreational activity at Redberry, it became clear that more information was needed on the current wildlife resources of the lake in order to provide guidance to avoid harmful impacts on the area. A joint study was undertaken from May to November 1985 by the Canadian Wildlife Service, the Saskatchewan Wildlife Branch and the Saskatchewan Natural

History Society, as represented by the Saskatoon Natural History Society. Also, researchers from the Department of Zoology, University of Guelph, assisted in the study.

In the following report we:

1) Briefly describe the birds and habitats of the Redberry Lake study area (Figure 1), with emphasis on the species and places where environmental conflicts are most likely to occur and,

2) Recommend a management plan for the area.

THE BIRDS OF REDBERRY LAKE

Birds, especially migratory birds, are the primary wildlife resource of Redberry Lake, both for non-consumptive use (conservation of rare and endangered species, bird-watching, nature study) and consumptive use (hunting of waterfowl and upland game birds). Accordingly, our studies in 1985 and our review of previous information focused on the birds. To complement our studies of bird distribution, we also mapped the main cover-types or habitats of our study area.

The species, abundance and status of the birds of Redberry Lake are summarized in Table 1, from our observations in 1985 and additional previous records. A total of 188 species has been confirmed. The list includes 4 species recognized by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as species of national concern, classified as: Endangered (threatened with extinction in all or part of their range, owing to the action of man) or Threatened (likely to become endangered if the factors affecting its vulnerability do not become reversed).

Species and groups of birds which are of key or special importance to Redberry Lake are reviewed below.

KEY SPECIES OF BIRDS

Piping Plover

In 1985 COSEWIC designated the Piping Plover as Endangered. Previously listed as Threatened, it is the first species of plant or animal whose plight has worsened since the COSEWIC process began. It nests primarily on the shores of saline lakes in the prairies of western Canada and the USA, with smaller numbers on beaches of the Great Lakes and eastern Canada. The world population of the species is probably less than 5,000 birds. Approximately half of the total breed in Saskatchewan. At Redberry Lake, total shoreline surveys in June tallied 41 birds in 1984 and 41 again in 1985 (Figure 2). With 2% of the Saskatchewan total, Redberry is one of the 7 most important nesting lakes in the province.

The main causes of the decline in Piping Plover throughout its range are considered to be human disturbance and habitat destruction on beaches, its primary breeding habitat. At Redberry Lake we found nesting and non-breeding birds on the shores of the islands and all sides of the lake, with concentrations in certain areas (Figure 2). A primary concern for management is to protect the Piping Plover and its habitat from disturbance.

American White Pelican

In 1979-81, Saskatchewan held 28% of the world's breeding population of 109,000 American White Pelican, a species classified as Threatened by COSEWIC. In 1985 Redberry Lake was one of 11 Saskatchewan

colonies. Approximately 350 pairs nested on Pelican Island, which amounted to 2% of the provincial total. At Redberry the pelicans feed primarily on Swystun Bay and the bay at the mouth of Oscar Creek. However, their main feeding areas appear to be on lakes and rivers surrounding Redberry. They use the islands and the mainland shore, especially the southeast, as loafing sites.

Although the population has increased in recent years, the history of pelican colonies in Saskatchewan and elsewhere has shown clearly that human disturbance can cause nest abandonment, destruction of eggs and young, increased predation by gulls and abandonment of colony sites. Breeding pelicans are very sensitive to foot travel, boats, or low-flying aircraft on or near their nesting sites.

White-winged Scoter

Estimated at approximately 600,000 birds in 1970, the continental population of White-winged Scoters has declined over the past 15 years. Redberry Lake supports an average of 400 pairs, which makes it the largest known single concentration in its breeding range, which covers much of western Canada and Alaska.

The Redberry scoters have been intensively studied since 1975. In fact, they are one of only 3 subpopulations of waterfowl in North America where detailed research on marked birds and individual histories is being conducted. About 25% of the birds nest on the islands, particularly Gull and Pelican islands, with the remainder nesting on the mainland of the lake. The scoters use all parts of the lake waters for feeding, brood-rearing and moulting, with concentrations in Swystun Bay, the bay at the mouth of Marshy Creek, the southeast quadrant, and the bay at the mouth of Oscar Creek.

KEY GROUPS OF BIRDS

Species of National Concern

In addition to Piping Plover and American White Pelican, 2 other COSEWIC species classified as Endangered or Threatened have been recorded at Redberry Lake.

The Whooping Crane (Endangered), totalled 127 birds in the wild and 40 in captivity in January 1986. Redberry Lake is in the centre of the species' spring and fall migration corridor across Saskatchewan. Confirmed sightings of Whooping Cranes were made on or near Swystun Bay in 1977 and 1983, and unconfirmed sightings were reported in 4 other years. Since 3 of the latter sightings were also at Swystun Bay, it appears that the cranes are attracted to that part of Redberry. It is noteworthy that in 1985 we recorded at least one pair of Sandhill Cranes which nested and reared young in the Swystun Bay area, making Redberry one of the few Saskatchewan breeding locations for that species.

A single Peregrine Falcon was recorded over the east shore of Redberry in 1985. It could have belonged to either the anatum (Endangered) or tundrius (Threatened) race.

Colonial Species

In addition to the American White Pelican and White-winged Scoter, the islands of Redberry support colonies of Double-crested Cormorants, Common Terns, California Gulls and Ring-billed Gulls (Table 2). As discussed for pelicans, these colonial nesters are vulnerable to human disturbance from the ground, water or air.

Waterfowl

A wide variety of waterfowl is found at Redberry: 22 species of ducks, 4 species of geese and the Tundra Swan (Table 1).

Although most of the ducks occur as both breeders and migrants, Redberry is particularly important as an autumn staging area. It is of critical importance during low-water years in providing a resting area for migrants. In late August 1984, when surrounding water bodies were dry, approximately 20,000 ducks were recorded at Swystun Bay alone. In 1985, fall numbers were lower since higher water levels in the region meant less concentration on Redberry. We recorded peak numbers of approximately 6,000 birds on the lake in mid-September and mid-October. Mallard was the most common species (60% to 80%). Swystun Bay, the northeast quadrant and the southeast quadrant had the highest proportions of total birds.

Canada Geese nest on the islands and mainland and rear their broods on the lake. Swystun Bay is especially important: we recorded a total of 250 young there in early July 1985. Hundreds of migrant Canada, Snow, Greater White-fronted, and Ross' Geese, along with Tundra Swans, staged on the lake in autumn 1985.

Shorebirds

In addition to the Piping Plover discussed above, 28 species of shorebirds have been recorded at Redberry (Table 1). Of those, 11 species are confirmed or suspected breeders. We conducted 2 complete shoreline counts: from 31 May to 5 June totals were 11 species and 410 birds; on 14 August totals were 19 species and 810 birds. In both surveys the south and east shores had the highest proportions of total birds.

Loons, Grebes and Phalaropes

Breeding and migrant Common Loons are found at Redberry. On 24 August 1985 we recorded 6 pair with young, which is a significant

number for a lake in southern Saskatchewan. Five species of grebes are suspected to breed on the lake (Table 1). Numbers of migrant grebes peaked in early August with species totals as follows: 3,000 Eared, 1,000 Horned, 500 Western and 200 Red-necked. Wilson's and Red-necked Phalaropes stage on Redberry during autumn migration. In 1985 their combined numbers peaked at approximately 10,000 in late August on the east side of the lake.

Upland Species

The uplands, defined as the uncultivated area above the beach habitats, contain a variety of habitats from marsh to trees. As such, the uplands have a much greater variety of avian species than the zones discussed above. The complexities of quantitative surveys of upland birds made it difficult to determine the relative value of different parts of the uplands around Redberry. We used the species composition to determine an avian "score" for each of 10 sectors of the study area (Figure 3). First, we assigned species scores based on their abundance in Saskatchewan: rare = 50, uncommon = 25, fairly common = 10, common or abundant = 5. Next, if the species was confirmed or suspected to breed at Redberry (Table 1), its score was multiplied by 5. Finally, if the species was a legal game bird in Saskatchewan, 25 points were added. Thus, avian scores were calculated from our May and June 1985 survey results by totalling the respective species scores for each sector. Sector scores (Figure 3), in descending order were: 1950 (Sector 5), 1505 (7), 1400 (4), 1335 (10), 1275 (9), 1250 (8), 1135 (2), 1075 (6), 975 (3), and 875 (1). The scores provide a scale of relative avian importance of the sectors in guiding or controlling human activities which could destroy habitats or disturb birds in the uplands.

HABITATS

In 1985 we used aerial photographs with ground verification to map the basic cover types or habitats of the Redberry Lake study area. Cover types were defined as follows: lake water (excluding creeks and Swystun Bay); sandy, rocky or muddy beach; grass; shrubs; trees; pond/stream (including creeks and Swystun Bay); marsh; unvegetated upland; human impact (from non-cultivation activities); and cultivated (croplands currently cultivated). Basically, the lake waters are surrounded by a fringe of uncultivated native habitats which are in turn surrounded by cultivated farmlands (Figure 3). Except for relatively large areas of marsh in the southwest and of trees in the northeast, the uncultivated habitats were mixed and interspersed throughout the mainland and the islands.

LAKE WATER LEVELS AND SALINITY

The long-term physical changes caused by dropping water levels and increasing salinity must be considered in predicting or planning future use of the Redberry area.

The water level appears to have dropped continuously since Redberry Lake was first surveyed in 1906-1909. From that time to the present there was a net loss of 36 km of shoreline, 250 ha of island habitats, and 2430 ha of surface water (Figure 4). Data collected from 1966 to 1985 show that the water level has decreased at an average of 10.5 cm per year. Since the Migratory Bird Sanctuary is legally defined as "comprising the lands covered by the waters from day to day of Redberry Lake, together with the islands therein...", the falling water level means that the Sanctuary is shrinking in area. Up to now the newly

exposed shore lands have been officially considered to be provincial Crown land. However, arguments are being made that such lands should accrue to the owners of adjacent area (within that quarter section) through the "Law of Accretion".

Concomitant with decreased water level, the concentrations of salts (primarily sodium, magnesium and sulphates) have increased at approximately 1.6% per year from 1920 to 1973. The salinity in 1940 (13,400 ppm) was approximately half of what it is today. Biological studies of lakes in Saskatchewan and elsewhere have shown a general decrease in species diversity and productivity as salt loads increase.

It is important to recognize that Redberry will get smaller and saltier in the coming years. We should expect and plan for those changes which will affect both wildlife and recreation.

RECOMMENDATIONS FOR MANAGEMENT OF REDBERRY LAKE

1. The islands are absolutely essential to the colonies of American White Pelicans, Double-crested Cormorants, Common Terns, California Gulls and Ring-billed Gulls. They are also very important for Piping Plover, White-winged Scoter and other shorebirds and waterfowl. These species are vulnerable to human disturbance, and this is the most sensitive part of the lake. Therefore, provincial and federal legislation should be strictly enforced to keep unauthorized people away from the islands and adjacent waters (see point 3 below).

2. The shoreline provides essential breeding habitat for Piping Plover, important breeding and migration habitat for many shorebirds, and important loafing habitat for waterfowl, pelicans and other birds. Beach travel by motorized vehicles should be prohibited on all shores of

the lake. Special efforts should be made to prevent human disturbance in the zones used by significant concentrations of migratory birds.

3. Waters of the lake provide important feeding, moulting, brood-rearing, roosting and migration staging areas for thousands of birds of many species. Motorboats pose the most serious disturbance to birds on the water. Access points should be restricted and, if increasing boat traffic causes significant disturbance to water birds, motor size should be limited. Acutely sensitive water areas (Figure 3) in the southwest, surrounding the islands and including Swystun Bay and Marshy Creek, should be declared off-limits to boats, including sailboats and canoes.

4. Construction of additional cottages, roads and related facilities should be carefully regulated and managed, to avoid additional disturbance to birds and habitats of the uplands and shoreline. The northwest part of the lake already has extensive development and disturbance in the Regional Park, and it rated the lowest avian score in 1985 (sector 1 in Figure 3). Therefore, if resort developments must proceed, they should be kept within that sector. Recognizing the need to keep human disturbance away from the sectors of higher avian value for uplands (Figure 3), the concentration areas of Piping Plover (Figure 2), the islands and the restricted areas of lake water (Figure 3), developments should be prohibited in the southwest (all of sectors 2, 4 and 5) and parts of the south, east and northeast (parts of sectors 6 to 10).

5. The location and status of all Crown land (including all areas which have emerged since the original legal surveys) should be fully clarified. Existing classification as Critical and Important Wildlife

Habitat should be reviewed and reassessed on the basis of current information on all wildlife and habitat. Crown lands with significant wildlife values with no protection at present should be classified as Critical Wildlife Habitat.

6. Investigations should be done on what the consequences of decreasing water level and increasing salinity will be for future use of the lake by wildlife and people.

7. An information and education program should be implemented to inform the public of the wildlife of Redberry Lake and the need for public co-operation in conservation. The program should be implemented with input and assistance from local residents and groups, including the Saskatchewan Wildlife Federation and the Saskatchewan Natural History Society. Brochures and display material should be provided to the Regional Park, the church camp, the sailing club, local schools and local residents. Additional signs should be posted on all access roads and trails, on all the islands and on buoys in the water to advise the public of the Migratory Bird Sanctuary, the Critical Wildlife Habitat lands, and the restricted water areas.

Table 1. Abundance (*) and status (†) of birds in the Redberry Lake area in 1985, with additional records (≠).

Species	*	†	≠	Species	*	†	≠
Common Loon	C	B		Sora	U	b	
Pied-billed Grebe	U	b		American Coot	C	B	
Horned Grebe	C	b		Sandhill Crane	U	B	
Red-necked Grebe	C	b		Whooping Crane	R	T	3
Eared Grebe	U	b		Black-bellied Plover	C	T	
Western Grebe	C	b		Lesser Golden-Plover	R	T	
American White Pelican	C	B		Semipalmated Plover	C	T	
Double-crested Cormorant	C	B		Piping Plover	C	B	
American Bittern	R	?		Killdeer	C	B	
Great Blue Heron	U	b		American Avocet	C	b	
Tundra Swan	C	T		Greater Yellowlegs	U	T	
Gr. White-fronted Goose	U	T		Lesser Yellowlegs	C	b	
Snow Goose	C	T		Solitary Sandpiper	U	T	
Ross' Goose	R	T		Willet	C	B	
Canada Goose	C	B		Spotted Sandpiper	C	B	
Green-winged Teal	C	b		Upland Sandpiper	U	b	5
American Black Duck	R	N		Whimbrel	R	T	4
Mallard	C	B		Long-billed Curlew	U	b	
Northern Pintail	C	B		Hudsonian Godwit	U	T	
Blue-winged Teal	C	B		Marbled Godwit	C	B	
Cinnamon Teal	R	N	5	Ruddy Turnstone	U	T	
Northern Shoveler	C	B		Red Knot	U	T	4
Gadwall	C	B		Sanderling	C	T	
Eurasian Wigeon	A	N	6	Semipalmated Sandpiper	C	T	
American Wigeon	C	B		Least Sandpiper	C	T	
Canvasback	C	B		White-rumped Sandpiper	C	T	
Redhead	C	b		Baird's Sandpiper	C	T	
Ring-necked Duck	U	T		Pectoral Sandpiper	C	T	
Lesser Scaup	C	B		Stilt Sandpiper	C	T	
Harlequin Duck	A	N	5	Long-billed Dowitcher	C	T	
White-winged Scoter	C	B		Common Snipe	U	b	
Common Goldeneye	C	b		Wilson's Phalarope	C	B	
Bufflehead	C	b		Red-necked Phalarope	C	T	
Hooded Merganser	U	b		Franklin's Gull	C	b	
Common Merganser	U	b		Bonaparte's Gull	U	b	
Red-breasted Merganser	U	T		Ring-billed Gull	C	B	
Ruddy Duck	U	b		California Gull	C	B	
Turkey Vulture	R	N	4	Herring Gull	R	B	
Bald Eagle	U	T		Common Tern	C	B	
Northern Harrier	U	b		Forster's Tern	U	b	
Sharp-shinned Hawk	U	b	4	Black Tern	C	b	
Cooper's Hawk	R	?		Rock Dove	U	?	
Swainson's Hawk	U	b		Mourning Dove	C	b	
Red-tailed Hawk	U	B		Black-billed Cuckoo	U	b	
Rough-legged Hawk	R	T		Great Horned Owl	U	b	
American Kestrel	U	b		Snowy Owl	U	W	
Merlin	U	b		Common Nighthawk	U	?	
Peregrine Falcon	R	T		Ruby-th. Hummingbird	U	b	5,4
Grey Partridge	R	?		Belted Kingfisher	U	b	4
Ruffed Grouse	U	b		Yellow-bellied Sapsucker	U	b	
Sharp-tailed Grouse	U	B		Downy Woodpecker	U	b	

Table 1. Concluded.

Species	*	†	≠	Species	*	†	≠
Hairy Woodpecker	U	b		Yellow-rumped Warbler	U	T	4
Northern Flicker	U	b		Palm Warbler	U	T	4
Western Wood-Pewee	U	b		Blackpoll Warbler	U	T	4
Alder Flycatcher	U	b		Black-and-white Warbler	U	T	4
Least Flycatcher	C	b		American Redstart	U	b	
Eastern Phoebe	U	b		Ovenbird	U	?	
Great Crested Flycatcher	U	b		Northern Waterthrush	U	T	4
Western Kingbird	U	?		Mourning Warbler	U	T	4
Eastern Kingbird	C	B		Common Yellowthroat	U	b	
Horned Lark	U	b		Scarlet Tanager	R	?	
Purple Martin	?	b	4	Western Tanager	R	b	
Tree Swallow	C	b		Rose-breasted Grosbeak	U	b	
N. Rough-winged Swallow	U	b	5	Rufous-sided Towhee	U	b	
Bank Swallow	U	b		American Tree Sparrow	U	?	
Cliff Swallow	U	?		Chipping Sparrow	U	T	
Barn Swallow	C	b		Clay-colored Sparrow	C	B	
Blue Jay	U	W	4	Vesper Sparrow	C	B	
Black-billed Magpie	C	B		Lark Sparrow	U	?	
American Crow	C	B		Savannah Sparrow	C	B	
Common Raven	U	W		Baird's Sparrow	C	b	
Black-capped Chickadee	U	b		Grasshopper Sparrow	U	b	
Red-breasted Nuthatch	U	T		Le Conte's Sparrow	U	b	
House Wren	U	B		Sharp-tailed Sparrow	U	b	
Marsh Wren	U	b		Song Sparrow	C	b	
Mountain Bluebird	U	b		Lincoln's Sparrow	?	b	4
Veery	U	b		White-throated Sparrow	U	T	4
Swainson's Thrush	U	T	4	White-crowned Sparrow	U	T	
American Robin	U	b		Harris' Sparrow	U	T	4
Grey Catbird	U	b		Lapland Longspur	C	T	
Brown Thrasher	U	b		Snow Bunting	?	W	4,2
Sprague's Pipit	U	b		Red-winged Blackbird	C	b	
Bohemian Waxwing	C	W	4	Western Meadowlark	C	B	
Cedar Waxwing	C	b		Yellow-headed Blackbird	U	b	
Northern Shrike	U	T	4	Brewer's Blackbird	C	B	
Loggerhead Shrike	U	?	1	Common Grackle	?	b	
European Starling	C	B		Brown-headed Cowbird	C	b	
Warbling Vireo	U	b		Northern Oriole	U	B	
Red-eyed Vireo	U	b		Pine Grosbeak	U	W	4
Tennessee Warbler	U	T	4	Purple Finch	U	b	4
Orange-crowned Warbler	U	b		Common Redpoll	C	W	4
Nashville Warbler	U	T	4	Pine Siskin	U	b	4
Yellow Warbler	C	B		American Goldfinch	C	b	
Cape May Warbler	U	T	4	House Sparrow	C	b	

* Abundance: C = Common, U = Uncommon, R = Rare, A = Accidental, ? = Unknown.

† Status: B = Confirmed Breeder, b = Suspected Breeder, N = Non-breeder (summer resident), T = Transient, W = Winter Visitor, ? = Unknown.

≠ Record by: 1 = J.A. Munro (1921); 2 = J.B. Gollop (1972-74); 3 = J.R. Smith (1977) and E. Kuyt (1983); 4 = D.A. Weidl and T. Toews (1980-85); 5 = M. Wiercinski and K. De Smet (1984); 6 = G. Dobush (1985).

Table 2. Numbers of nests of colonial birds recorded on islands of Redberry Lake in June 1985; data provided by P. Kehoe (scoters) and K. Roney (all others).

Species	Gull Island	Old Tern Island	New Tern Island	Pelican Island	Total
American White Pelican	-	-	-	347	347
Double-crested Cormorant	-	-	-	43	43
White-winged Scoter	49	3	-	36	88
California and Ring-billed Gull	-	-	400	2300	2700
Common Tern	-	-	200	-	200

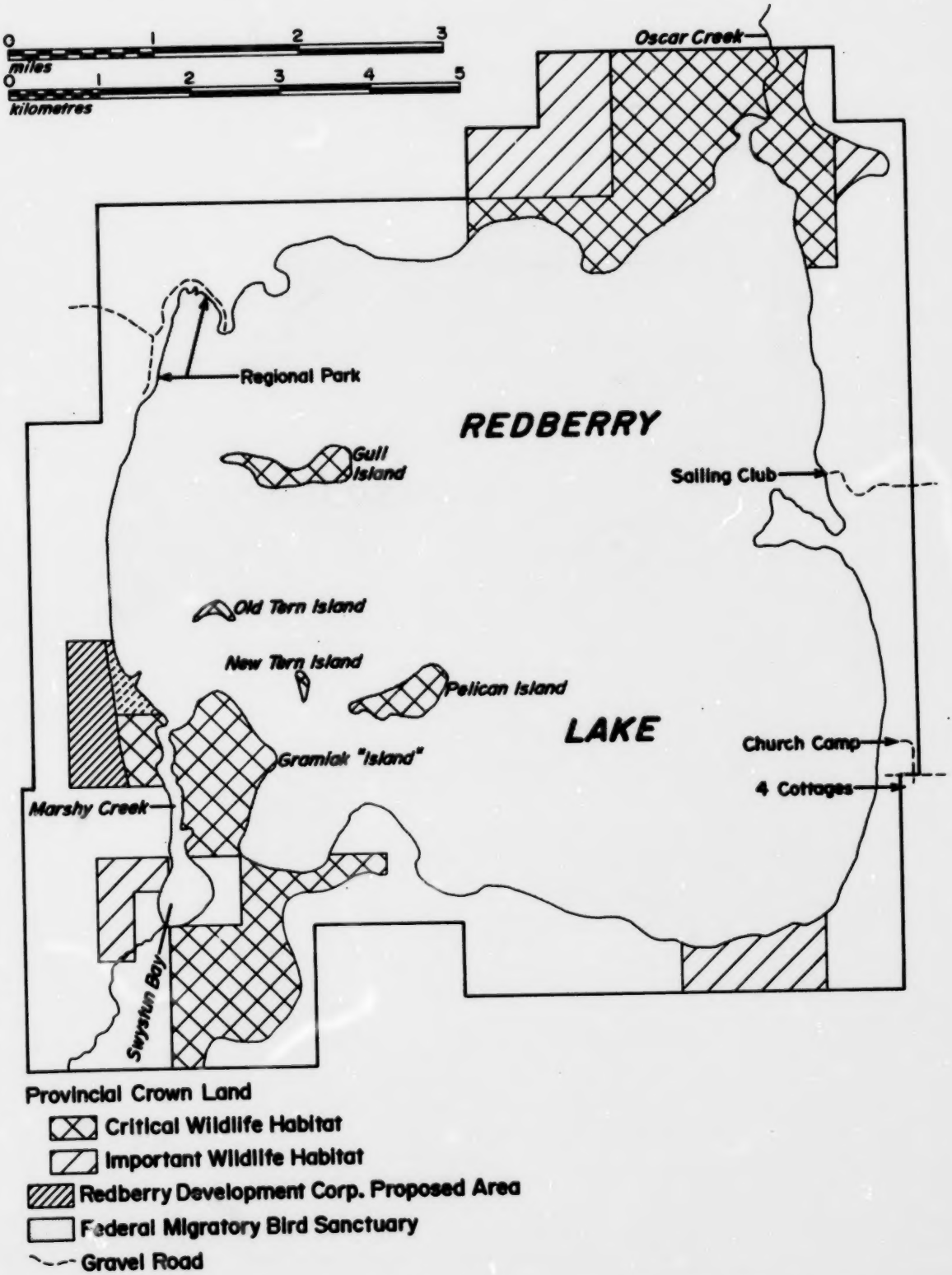

Figure 1. Outline map of 1985 study area at Redberry Lake, Saskatchewan, showing recreation development sites and approximate delineation of conservation areas.

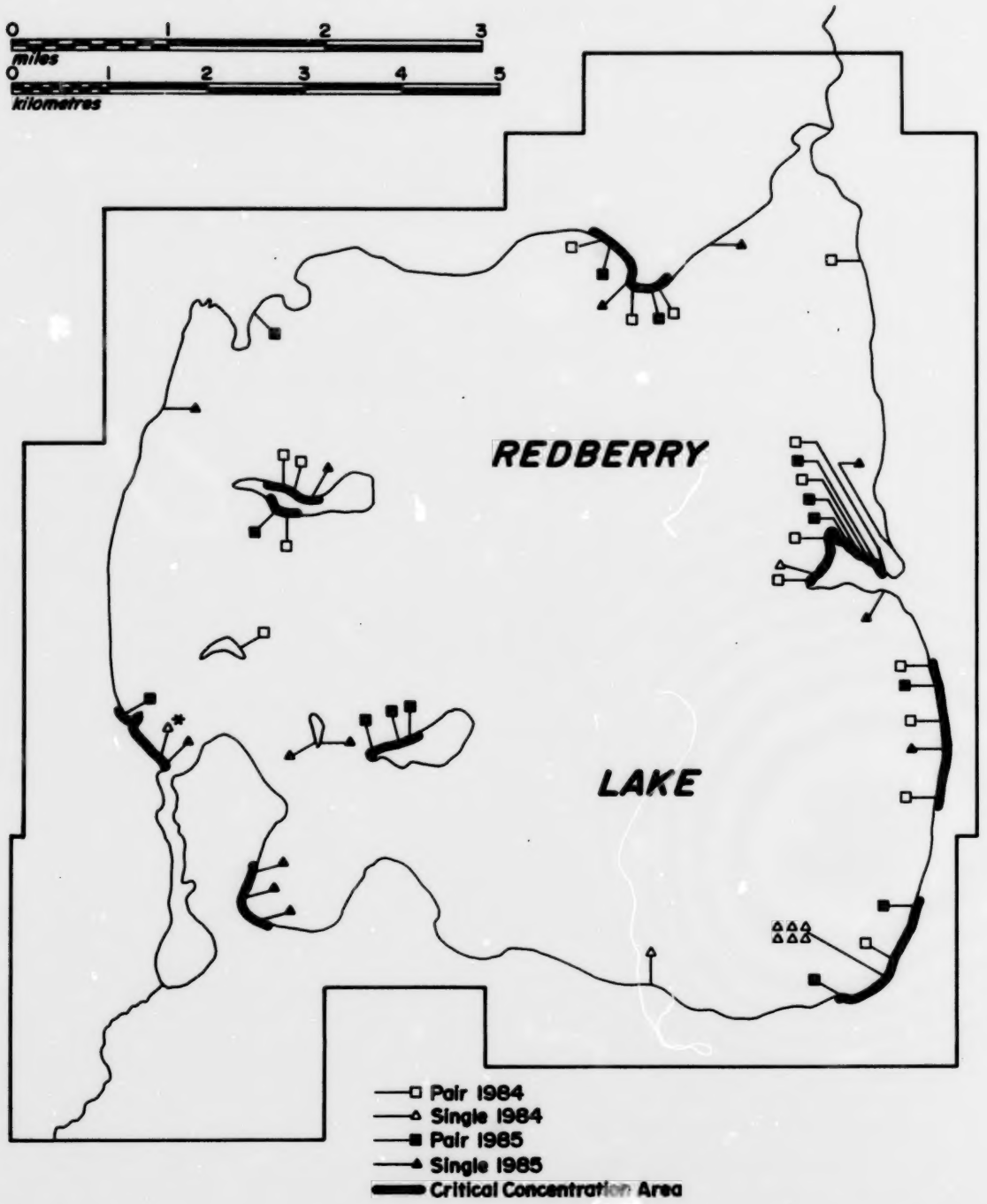

Figure 2. Distribution of Piping Plover at Redberry Lake: 15*, 28, and 29 June 1984; 31 May-5 June (mainland) and 21 June (islands) 1985.

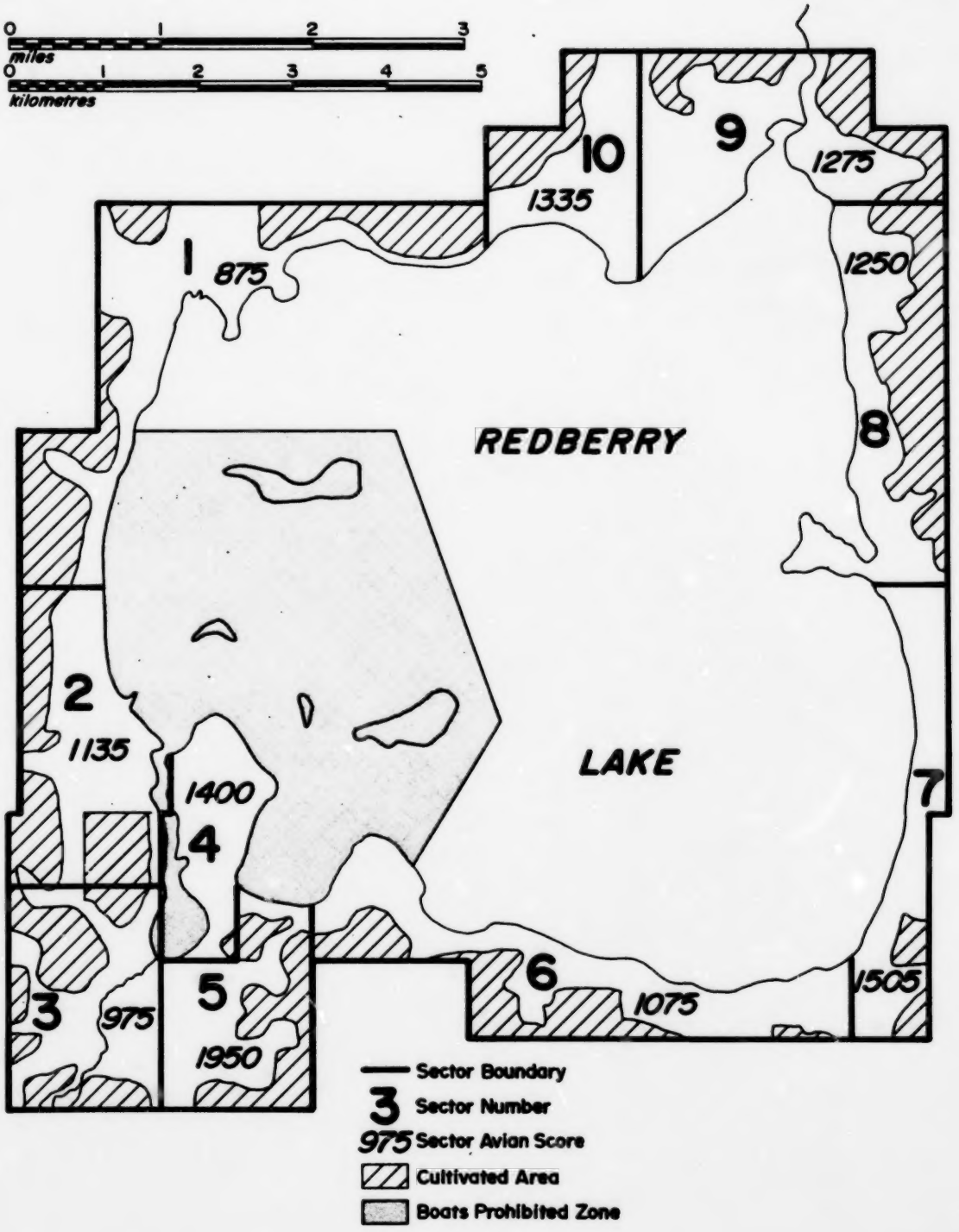

Figure 3. Redberry Lake study area in 1985, showing sector avian scores, cultivated areas, and proposed boats prohibited zone.

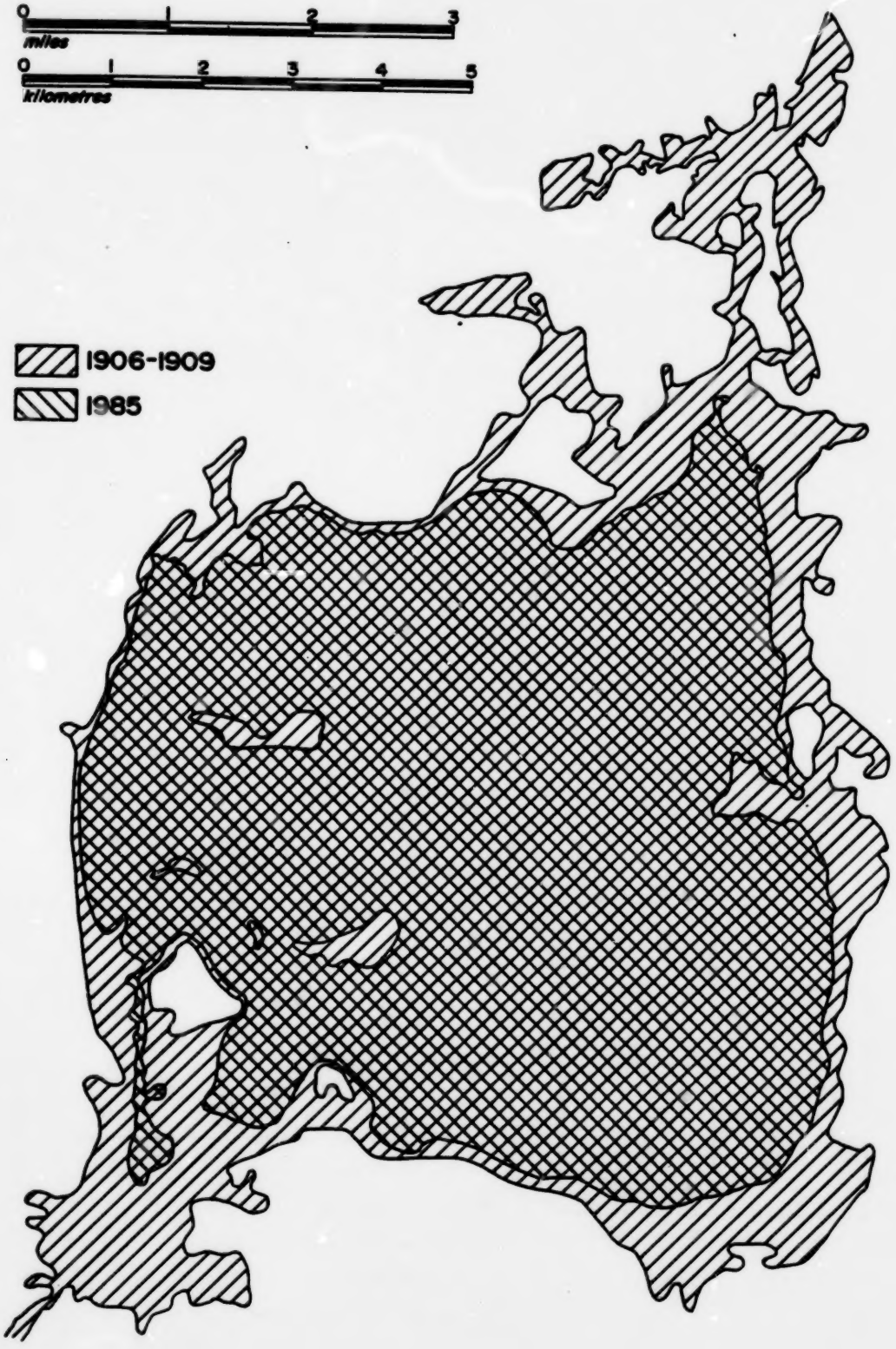

Figure 4. Redberry Lake, showing the decrease in area covered by water from 1906-09 to 1985.